

CLAIMS

1 1. A method for making a superconducting metal
2 oxide complex, comprising the steps of:
3 mixing solid compounds containing L, M, A and O
4 in amounts appropriate to yield the formula $(L_{1-x}M_x)_aA_bO_y$,
5 wherein L is lanthanum, lutetium, yttrium, scandium or a
6 combination thereof; M is barium, strontium, calcium,
7 magnesium, mercury or a combination thereof; A is copper,
8 bismuth, titanium, tungsten, zirconium, tantalum, niobium,
9 vanadium or a combination thereof; "a" is 1 to 2; "b" is
10 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to
11 about 4;

12 compacting the mixture into a solid mass by
13 application of pressure from about 100 to about 30,000
14 psi;

15 heating the solid mass in air to a temperature
16 of from about 900 to about 1100°C for at least about 5
17 minutes; and

18 quenching the solid mass to ambient temperature
19 in air.

1 2. The method of claim 1, wherein L is yttrium, M
2 is barium and A is copper.

1 3. The method of claim 2, wherein the mixture is
2 compacted to a solid mass by application of pressure of
3 from about 100 to about 500 psi.

1 4. The method of claim 3, wherein the solid mass is
2 heated at 900-1100°C for a period of from about 5 to about
3 15 minutes.

1 5. A superconducting metal oxide complex having the
2 formula $(L_{1-x}M_x)_aA_bO_y$, wherein L is lanthanum, lutetium,
3 yttrium, scandium or a combination thereof; M is barium,
4 strontium, calcium, magnesium, mercury or a combination

5 thereof; A is copper bismuth, titanium, tungsten,
6 zirconium, tantalum, niobium, vanadium or a combination
7 thereof; "a" is 1 to 2; "b" is 1; "x" is about 0.01 to
8 about 0.5; and "y" is about 2 to about 4; said complex
9 made by a process comprising the steps of:

10 mixing solid compounds containing L, M, A and O
11 in amounts appropriate to yield the formula $(L_{1-x}M_x)_aA_bO_y$,
12 wherein L is lanthanum, lutetium, yttrium, scandium or a
13 combination thereof; M is barium, strontium, calcium,
14 magnesium, mercury or a combination thereof; A is copper,
15 bismuth, titanium, tungsten, zirconium, tantalum, niobium,
16 vanadium or a combination thereof; "a" is 1 to 2; "b" is
17 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to
18 about 4;

19 compacting the mixture into a solid mass by
20 application of pressure from about 100 to about 30,000
21 psi;

22 heating the solid mass in air to a temperature
23 of from about 900 to about 1100°C for at least about 5
24 minutes; and

25 quenching the solid mass to ambient temperature
26 in air.

1 6. The complex of claim 5, wherein L is yttrium, M
2 is barium and A is copper.

1 7. The complex of claim 6, wherein the mixture is
2 compacted to a solid mass by application of pressure of
3 from about 100 to about 500 psi.

1 8. The complex of claim 7, wherein the solid mass
2 is heated at 900-1100°C for a period of from about 5 to
3 about 15 minutes.

1 9. A superconducting metal oxide structure,
2 comprising:
3 a copper substrate; and

1 a metal oxide complex deposited on said
2 substrate, said complex having the formula $(L_{1-x}M_x)_aA_bO_y$
3 wherein L is lanthanum, lutetium, yttrium, scandium or a
4 combination thereof; M is barium, strontium, calcium,
5 magnesium, mercury or a combination thereof; A is copper,
6 bismuth, titanium, tungsten, zirconium, tantalum, niobium,
7 vanadium or a combination thereof; "a" is 1 to 2; "b" is
8 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to
9 about 4.

1 10. The structure of Claim 9, wherein the metal
2 oxide complex has a first layered phase adjacent said
3 copper substrate as a glossy insulating layer phase, a
4 second superconducting phase layered on the first phase,
5 and a third phase layered on the second phase which is an
6 insulator phase.

1 11. The structure of claim 10, wherein L is yttrium,
2 M is barium and A is copper.

1 12. A method for making a superconducting metal
2 oxide complex, comprising the steps of:
3 mixing solid compounds containing L, M, A and O
4 in amounts appropriate to yield the formula $(L_{1-x}M_x)_aA_bO_y$,
5 wherein L is lanthanum, lutetium, yttrium, scandium or a
6 combination thereof; M is barium, strontium, calcium,
7 magnesium, mercury or a combination thereof; A is copper,
8 bismuth, titanium, tungsten, zirconium, tantalum, niobium,
9 vanadium or a combination thereof; "a" is 1 to 2; "b" is
10 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to
11 about 4;
12 depositing the mixture on a copper substrate;
13 compressing the mixture on the copper substrate
14 to form the oxide mixture into a layer on the copper
15 substrate;

16 heating the substrate and oxide mixture layer
17 thereon to a temperature of from about 900 to 1100°C for
18 at least about 5 minutes; and
19 quenching the substrate and oxide mixture layer
20 thereon to ambient temperature in air.

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